
Nitrogen Metabolism in Lentil (*Lens culinaris*) and Dry Bean (*Phaseolus vulgaris*) During Drought

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Abstract

Pulse crops are an attractive addition to a crop rotation because of their ability to supply most of their own nitrogen, which in turn reduces input costs. In recent years, drought has devastated much of the prairie region. We examined the effects of drought stress on nitrogen fixation in lentils (*lens culinaris*) and dry beans (*Phaseolus vulgaris*) to better understand and improve the drought tolerance of future varieties. Ureides are the plant nitrogenous compounds that are transported after nitrogen fixation to various plant organs, where they are subsequently used to produce amino acids. By identifying and studying the components of nitrogen fixation, preliminary observations have been made as to how the fixation process is affected by drought stress. Plants were grown in a greenhouse until they reached the flowering stage, and were then subjected to a 13 - day drought cycle. Plants that underwent the stress treatment were compared to a well watered set of control plants. Measurements during the stress were plant dry weight, plant total nitrogen content, plant ureide content and amount fixation, as determined by the ¹⁵N isotope procedure. Initial screening involved four bean cultivars (CDC Rosalee, CDC Pintium, Earliway and Othello), and four lentil cultivars (CDC Grandora, CDC Milestone, CDC Richlea and FLIP 96-27L). Of the initial eight cultivars, the most and least drought tolerant were chosen for further screening. The most drought tolerant cultivars were CDC Pintium (bean) and CDC Milestone (lentil). The least tolerant varieties chosen for comparison were Othello (bean) and CDC Grandora (lentil). Drought stress reduced dry weight, plant nitrogen content and nitrogen fixation in general. Initial results indicate that ureides build up in the least tolerant bean cultivars, yet continue cycling in the more tolerant cultivars during drought. This indicates that drought stress impacts on the cycling of plant nitrogen compounds produced as a result of fixation. Further research will be undertaken to determine how tolerant plants avoid this interruption and what can be done to improve the plant's cycling of its nitrogen. We anticipate plants with improved nitrogen metabolism will be more drought tolerant than existing cultivars.